Saskatchewan
Education

How Children Learn

Saskatchewan

September, 1982

HOW CHILDREN LEARN

A Background Paper

submitted to

The Curriculum and Instruction Review Committee

September 1982

By: David McCabe
Joanne McCabe
Bill Prentice

The following paper was
commissioned by the
Curriculum and Instruction
Review to provide background
to the Minister's Advisory
Committee on the issue of
how children learn.

The opinions expressed are
those of the authors.

"People are learning almost all the time" (Stenhouse, 1975,p. 24). Learning involves how we perceive, how we think, how we feel, and how we act. It is central to human behaviour, and, indeed, many psychologists believe that "most human behaviour is the result of learning" (Kolesnik, 1976, p.1). Living entails learning. Yet, what does it mean "to learn" and what happens when we learn? Why do some people learn more readily than others, and, maybe even more importantly, how can one person effectively help another person to learn?

There have been dozens of theories of learning. Out of these have emerged a general concept that learning entails change and some concepts of motivation, interest, insightful learning, meaning in learning, emotion in learning, and transfer of learning. As well, three general "schools" of thought -- behaviourism, cognitivism, and humanism -- have evolved. These concepts and theories each "rest on the investigator's conception of the nature of man..." (Allport, 1961, p. 84). Behaviourists, for example, believe that behaviour is controlled by external reward or reinforcement. Learning is viewed as a process of trial and error and is considered to occur when strong stimulus-response bonds have been established between the stimuli acting on an organism and the responses it makes accordingly. Cognitive psychologists, on the other hand, "delve into the internal processes by which an individual deals with the complexity of his environment" (Dembo, 1977, p. 204). Learnihg is seen as an "individual matter involving perception, the processing and assimilation of information, the development of insights, and the discovery of meaning" (Kolesnik, 1977, p. 17). It is judged to have occurred when the learner restructures his/her perception of the total situation (Zais, 1976, p. 259). In addition, cognitive-developmental psychologists believe that learning develops in sequential stages. Piaget, for example, conceptualized

> the development of thinking by means of stages which, it is claimed, are necessarily sequential, but uneven in their application. In one area of his thinking a child may be at one stage, in another area at another stage (Stenhouse, 1975, p. 27).

Children's thinking is seen as quantitatively and qualitatively different from adult thinking. Full human development incorporates intellectual, social, emotional, and physical growth and humanistic psychologists believe that "how a person 'feels' is as important as how he behaves or thinks" (Dembo, 1977, p.204). Humanists believe that people have a natural potentiality for learning but satisfaction of the learner's social and emotional needs is necessary for the optimum learning to occur. These psychologists are especially concerned with "self-actualization" -- the growth of persons in whatever area they choose.

In reality, there is no one behaviouristic, cognitive-developmental, or humanistic theory. Each school has its subdivisions and splinter groups and the boundaries between theories have become increasingly fuzzy. Nevertheless, these general theories have had a powerful impact on how learning is perceived by schools. Myron Dembo (1977) has summarized and compared the implications they have had for education.

A COMPARISON OF THE IMPLICATIONS OF BEHAVIOURISTIC, COGNITIVE-DEVELOPMENTAL, AND HUMANISTIC PSYCHOLOGY FOR EDUCATION

Table 1

	BEHAVIOURISTIC PSYCHOLOGY	COGNITIVE-DEVELOPMENTAL PSYCHOLOGY	HUMANISTIC PSYCHOLOGY
GOALS	A person able to fill a job well or to continue with his education because he has mastered skills and knowledge taught on a lower level. Competence is the goal of education.	A person who has optimally developed his cognitive functions and who is innovative and flexible in his thought processes. Most important, he is a person who can decentrate, especially by taking into account the points of view of others, as well as all possible outcomes in making decisions and carrying out actions. Intelligence applied equally well in decisions pertaining both to oneself and to others is the goal of education.	A loving, creative human being with a strong social conscience, aware of the needs of others, feeling fulfilled, and helping others to feel fulfilled. Self-fulfillment and understanding are the goals of education.
CURRICULAR OBJECTIVES	Focus on academic knowledge and skills and on socially defined personal and social behavior characteristics.	Focus on total development: sensory-motor, linguistic, and cognitive. Social interaction serves as a tool to develop decentration, intelligence, and logical thought.	Focus on social development, communication skills, sensitivity to beauty, and other humanistic values. The child's sensitivity to group needs as well as to individual needs is to be enhanced. Social influences are more emphasized than biological ones. The goal is optimum interrelationship with the environment, not adjustment.
DEGREE OF SYSTEMATIZATION	Very specific methods of classroom management and teaching are prescribed. Systematization is emphasized. Programmed material is suggested.	Progress in teaching is systematic, but classroom environment is free enough for exploration and discovery. Theory of cognitive development results in definite teaching approaches suitable for the child's developmental level.	A balanced curriculum and balance between freedom and discipline are advocated. Recognition of developmental progression is only one of the factors to be taken into account in adjusting to the child's needs. The teacher must be attuned to the child's intellectual, emotional, and social needs.

	BEHAVIORISTIC PSYCHOLOGY	COGNITIVE-DEVELOPMENTAL PSYCHOLOGY	HUMANISTIC PSYCHOLOGY
METHODOLOGY	Extensive and detailed methods and sequences to develop skills and specific knowledge are advocated. Use of computer and other machine technology to assist teachers.	Materials and curricula to develop basic cognitive skills, such as classification, seriation, conservation, imagery, and problem solving have been developed, as well as specific curricula in science, math, and social studies.	Emphasis on integrated project approach, with particular stress on social studies.
MAKING TEACHING MEANINGFUL	Emphasis is usually not on integration of topics but rather on a linear progression in teaching content and skills. Behaviorists are not concerned with "meaning" except as meaning is derived from understanding previous steps. Mastery is emphasized in behavioristic terms of specific mastery of subject matter or adjustment to classroom demands. Mastery or attainment of extraneous rewards makes learning meaningful.	Integration of knowledge is emphasized. Integration is not achieved merely by associations between thoughts, or between contents of curricula, or by addition of new knowledge. The hierarchical order of concepts and skills must be grasped to make meaningful what has been learned. Concepts are related to other coordinated, supraordinated, and subordinated concepts.	Meaning derives from integration of topics and relation of the content to the child's personal needs. Additional emphasis is placed on human needs in general, on creativity and involvement and on development of the child's feeling of "being in the world" and awareness of the world around him.
ACTIVE PARTICIPATION	Behaviorists are little concerned with activity, except if the activity is the behavior to be elicited. The child may be a rather passive recipient of knowledge and should follow directions. The behavior is shaped, not guided.	Activity is regarded as the basis of all mental development. The child learns by exploring and experimenting. In new learning, he proceeds from activity to perceptual learning and then to symbolic learning. To make symbolic learning possible he must learn to read, write, make graphs, use mathematical language, and so on.	Experience requires action. The child needs to relate himself actively to the environment and to share with others in activities. The child's need for play and activity must also be satisfied.

FORM OF CLASSROOM MANAGEMENT / INDIVIDUALIZATION	BEHAVIORISTIC PSYCHOLOGY	COGNITIVE-DEVELOPMENTAL PSYCHOLOGY	HUMANISTIC PSYCHOLOGY
	Individualization of task assignment taking the child's level of functioning into account. Individualization of rewards and of discipline.	Adaptation of tasks to child's developmental stage and previous experiences.	Individualization of total approach, according to needs and individuality of child, on an intuitive basis as a consequence of shared experience.
	Teacher-centered. The teacher prescribes curriculum and classroom procedures. Social relationships are not emphasized as goals but utilized as means.	Student-centered. The teacher assists the child and guides him in his learning, explorations, and discovery. The classroom structure permits and fosters self-direction.	Student-centered. The teacher assists child but does not direct him in his learning. The classroom structure permits freedom of choice for the child and and fosters creativity and exploration. The importance of human relationships is recognized. The classroom situation permits and should foster social learning.

Adapted by Dembo from M. Frostig and P. Maslow, Learning Problems in the Classroom (New York: Crune & Stratton,1973) pp. 97-103.

Although the majority of teachers cannot be neatly categorized as behavioristic, cognitive, or humanistic, those who act as "classroom manager or a director of the learning process" (Kolesnik, 1976, p.18) are often associated with the behaviourist, while those who place emphasis on perception and discovery methods of teaching are associated with the cognitive theorists, and those who attempt to create an educational environment that fosters self-actualization, with the humanists. In reality, most educators are more likely to be eclectic-- "selecting and adapting what they regard as the better features of each system" (Kolesnik, 1976, p.19) -- in their beliefs about how people learn and how people should be taught.

As a result of learning theory, practicing educators have evolved principles of learning and these principles have traditionally formed a base for classroom practice. Best known are the following principles developed by Hilgard and Bower (1966):

1. The learner should be active, rather than a passive listener or viewer.
2. Frequency of repetition is important in acquiring a skill such as typing, playing the piano, or speaking a foreign language.
3. Repetition should take place under conditions in which correct responses are rewarded (reinforcement).
4. Motivational conditions are important for learning.
5. Conflicts and frustrations in learning situations must be recognized and provision must be made for their resolution or accommodation.
6. Learning problems should be presented in a way that their structure (e.g., figure-ground relations organize interrelatedness etc.) is clear to the learner.
7. The organization of content is an important factor in learning and is an essential concern of the curriculum planner.
8. Learning with understanding is more permanent and more transferable than rote learning.
9. Goal setting by the learner is important as motivation for learning.
10. The learner's abilities are important, and provisions should be made for differential abilities.
11. The learner should be understood in terms of influences that have shaped his development.
12. The anxiety level of the individual learner is a factor affecting learning. With some kinds of tasks high-anxiety learners do better when interrupted with comments on their progress.
13. The organization of motives within the individual is a factor that influences learning.
14. The group atmosphere of learning (competition versus cooperation, authoritarianism versus democracy, etc.) will affect satisfaction in learning as well as the products of learning." (Hilgard and Bower, 1976, pp. 562-564, in Zais, 1976, pp. 291-292).

These principles are comprehensive and meet with the approval of most psychologists of learning whether behaviourists, cognitive-developmentalists, or humanists.

Some Variables Affecting Student Learning

While schools are by no means absolutely necessary for learning and while it has been recognized that "some of our most important learning occurs informally in situations outside the school" (Kolesnik, 1976, p.20), "the assumption underlying their existence is that they can and should facilitate learning, or make it more effective or efficient" (Kolesnik, 1976, p.4). Educational theory and research have identified a variety of factors or variables which singly or in combination affect school learning. The following model reasonably accommodates and illustrates the interrelationship among some important learning variables.

Table 2

A. Input Variables	B. Process Variables	C. Outcomes
1. Student Characteristics - Socioeconomic status (SES) - Home environment - Intelligence - Age and sex development - Learning styles - Self-concept	1. Instructional Practice (Teacher←→Learner) - Time - Attending to task - Content coverage - Classroom management - Questioning strategies - Use of praise - Feedback - Control factors - Clarity of presentation - Emphasis of verbal skills - Grouping - Teacher attitudes and expectations	I n c r e a s e d L e a r n i n g
2. Teacher Characteristics - Verbal ability - Academic level - Recency of training		
3. Curriculum Design - Aims, goals and objectives - Content and learning experiences - Instructional alternatives - Evaluation	2. Educational Climates i) Classroom Climate/ Classroom Management -teacher-student factors -learning environment -mainstreaming ii) School Climate -morale -teacher-principal relationship -home-school relationship -teacher commitment iii) Class Size	

> At times...I feel that the teacher is being conceived almost as a swordsman who lays about the learner with his repertory of sharp-pointed skills, each of which will have a mechanical effect on learning outcomes. The expectation seems to be that if he pushes on the learner with a certain kind of question, then a certain kind of learning will pop out and we will be able to see it quickly and clearly. Such is not the nature of the interaction between learning environments and learners. It is very rare that any one skill (any single sword thrust) or any stylistic characteristic will stand out as the cause of the learning. Even where we find that increased learning is associated with the presence of a certain kind of skill or style in teaching, it is very likely that the reason is because that skill or aspect of style is an index of a much larger complex of behaviors that signals the presence of a certain kind of environment (Joyce, 1975, p. 62).

A. Input Variables

"Teachers are in classrooms because they choose to be: pupils are in them because they have to be, and that one small fact can loom large" (Kash & Borich,1982, p. 61). Both students and teachers come to classrooms with some pre-existing conditions over which educators have little or no control. Teachers should be knowledgeable about these variables and cope in their efforts to maximize student learning and achievement.

1. Student Characteristics

Socioeconomic Status: "How much or how well a child learns in school depends to a very great extent on what he has learned elsewhere, particularly in his home" (Kolesnik, 1976, p.3).

Socioeconomic status is found to be a significant variable influencing school learning. Socioeconomic status has an important bearing on both teachers' perceptions of students, their treatment of learners in the classroom, and learners' perception of and attitude toward school. Lower socio-economic groups do not promote the values of deferred gratification, high aspirations, or the self confidence necessary for performance in competitive school life. Yee (1963) found that socio-economic status was the important variable determining teacher attitude toward students. The labelling theory advanced by Rist (1970) provides useful insights about how teacher expectations work in the "sorting and selecting" of students for differential treatment in program placement as well as in teacher-pupil interactions.

Home Environment: Home environment, both past and present, is an important predictor of school learning (Brophy and Evertson, 1977). Parent expectations of the learner, the amount of encouragement and support offered a child, the activeness of the family, the intellectuality of the home, family work habits and language models influence a child's learning in school (Iverson and Walberg, 1979).

Intelligence: Intelligence and socio-economic status are key predictors of student achievement in schools. Whether or not classroom procedures affect the growth and development of children has been seriously questioned by research (Coleman et al, 1966). Their research has indicated that a child's entering aptitude is of primary importance and, in fact, governs what the child will achieve in school. However, Feuersteins's recent work (1979, 1980) on the improvement of basic intelligence by teaching the thinking processes involved may result in intelligence being considered an alterable variable. In addition, Bloom (1980) argues that cognitive entry skills, knowledge or abilities are more reliable predictors of learning than is the notion of intelligence or aptitude.

Age and Sex: The age and sex of learners are powerful variables when examining learning and the growth of the brain. Typical curricula and classrooms assume that the brain is continuously growing and that learning takes place equally throughout the days and months of the school years. Epstein (1978), however, notes that brain growth does not occur continuously, but rather in sequences of spurts and plateaus that parallel the intellectual stages defined by Piaget(1964). Spurts are short periods of rapid periods of growth that create the neural networks needed for new cognitive functions, such as speaking and reading. During the longer periods of practically no growth, new functions are integrated into the total cognitive system.

Three periods of maximum brain growth and learning occur during school years - ages 6 to 8 years, 10 to 12+ years, and 14 to 16+ years. Spurts occur generally earlier for females and later for males. During the 10 to 12+ year growth spurt, the female brain is about three times that of males, and the situation is reversed, favoring males during the 14 to 16+ year growth period. Epstein (1978) also notes that 25% of learners go through a peak learning period during the summer months and that the brain develops in growth spurts and plateaus that parallel the intellectual stages defined by Jean Piaget. (See Table 3)

BRAIN GROWTH

Table 3

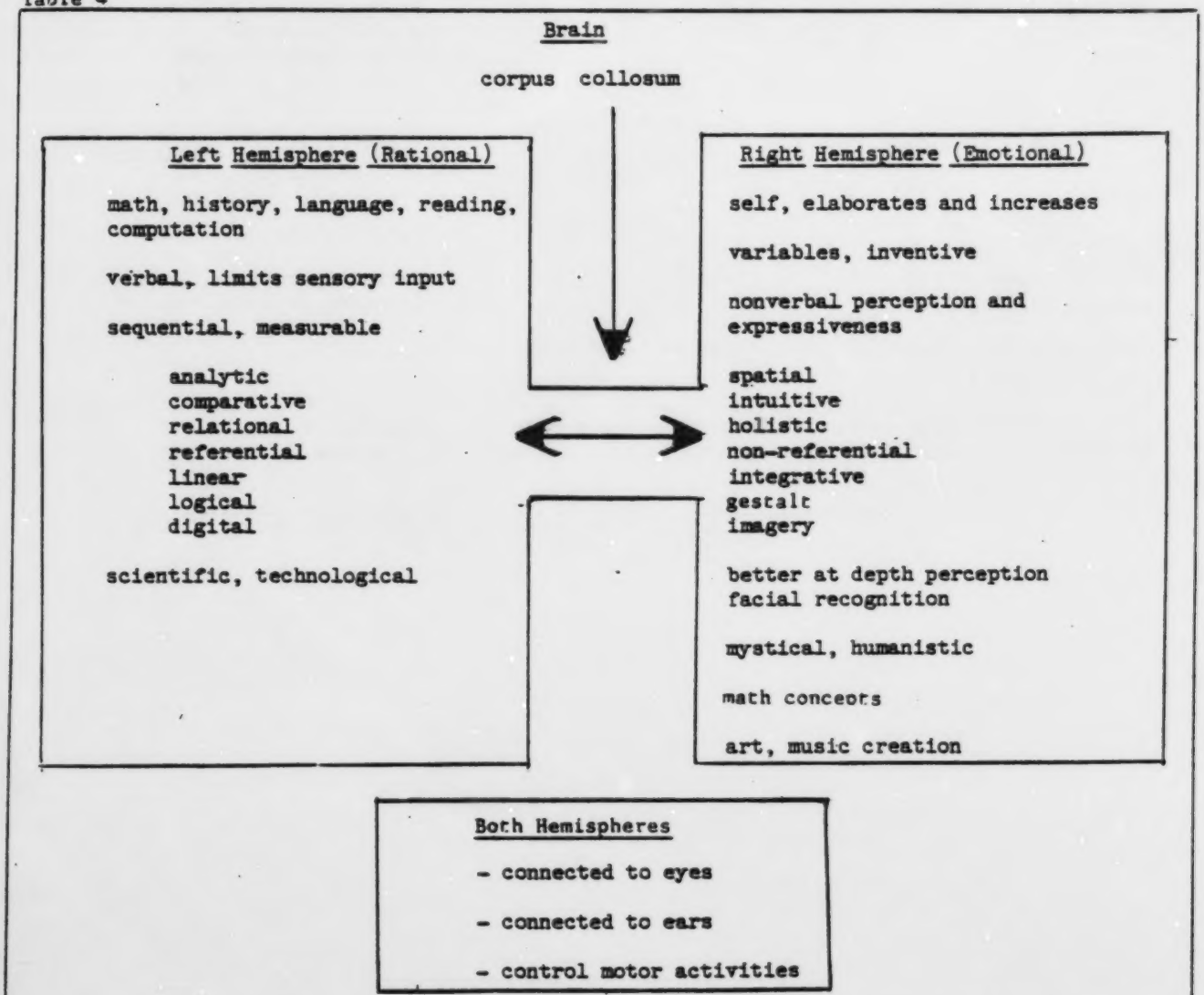
FOCUS	GROWTH SPURT years	PLATEAU years	PIAGET STAGE
neuron development	3-10 mos.	1	Sensorimotor 0-2 yrs. - organize physical action schemes - object permanence - sense of independent being
language development	2-3	4-6	Preoperational 2-7 yrs - learn to think - unsystematical and illogical thinking
reading and writing	6-7	8-9	Concrete Operations 7-11 yrs. - can think systematically only when refer to concrete objects and activities
abstract thought and problem solving	10-12+*	12-14	Formal Operations 11+ - become abstract thinker
(problem finding and self awareness)	14-16+**	16+	- - -

* during this stage female brain growth is 2 X male brain growth.
** during this stage male brain growth is at 2 X female brain growth.

adapted from Robert Sylwester, University of Oregon (1978)

The use of both brain hemispheres facilitates maximum learning. Samples (1975) has shown that when the process and functions of the right brain are facilitated, the self-esteem increases, the performance of skills typical of left brain functioning is enhanced, and the learners choose to explore greater numbers of content areas to greater depth. The specialization of the hemispheres is not absolute.

Table 4



In order to integrate perception and to develop maximum use of both hemispheres, learners require input from the auditory, visual, and tactile/kinesthetic modalities.

Adapted from Barbara Clarke (1979)

Nebes (1975) comments:

> If there is any truth in the assertion that our culture stresses left hemispheric skills, this is especially true of the school systems...If the right hemisphere does indeed process data in a manner different from the left, perhaps we are shortchanging ourselves when we educate only left-sided talents in basic schooling ....Many problems can be solved either by analysis or synthesis, but if people are taught habitually to examine only one approach their ability to choose the most effective and efficient answer is diminished. (p. 16).

All parts of the brain should be seen as interdependent.

Learning Style: Learning styles emerge from inborn, natural predispositions (Gregorc, 1979). During the past decade, research has demonstrated that each and every student -- regardless of age, socio-economic status, or IQ -- learns differently from others. Although some learning style characteristics may change as the child develops and matures, other characteristics seem to remain constant and affect the classroom learning process. Exploratory studies indicate that selected instructional methods, resources and programs appear to complement specific elements of an individual's learning style. When these methods, resources, and programs are matched with the learning style characteristics, learning increases and general attitudes improve. When they are mismatched, learning decreases and attitudes deteriorate (Dunn & Dunn, 1972).

Certain learning-style factors greatly influence how children learn in a classroom setting. These are:

a) field-dependent vs. field independent learning style (Sigel & Coop, 1974)

b) preferred sensory modality (Dunn & Dunn, 1972)

c) reflective vs. impulsive learning style (Sigel & Coop, 1974)

Cohen (1969) presents evidence that most school environments reflect the field-independent (analytical) style, and children who perceive items as discrete from their background, can provide structure to unstructured material, can learn independently and are analytical, tend to do well. It follows then, that field-dependent learners are at a disadvantage for learning in most classrooms. Dunns (1972) report that learning increases when

teaching input matches modality preference. And yet 90% of classroom instruction is conducted through either lecture or lecture discussion. However, modality preferences of school age children are as follows:

Table 5

•	auditory preference	20-30%
•	visual	40%
•	tactual-kinesthetic	30-40%
•	visual-tactual	
•	combination	

Dunn & Dunn, 1975

It is critical to understand the way children learn. In addition, persistance is one of the most important abilities a child must possess to learn successfully in school. Kagan (1966) reports that, in most school settings, the reflective, persistent child holds an advantage in learning over the impulsive child with a rapid tempo.

Self-concept: There is a significant relationship between self-concept and learning at each grade level (Combs et al, 1971). Torshen's (1969) summary of the studies showed that academic self-concept was clearly defined by the end of grade three, and that its correlation with achievement was in the order of +.50. One study found that self-concept in kindergarten children was a better predictor of reading success in subsequent years than IQ (Wattenberg & Clifford, 1964). School drop-outs and poor readers have low self-concepts (Zimmerman and Allebrand, 1965). Successful learners are likely to have high self-concepts. Students with negative beliefs and feelings about themselves are usually underachievers and failures in school learning (Bledsoe, 1967 ; Brookover et al, 1964). A child's concept of his ability to learn grows mainly from his classroom performance. Previous school experiences are crucial to a learner's self-concept.

2. Teacher Characteristics

Many years of intensive research on the characteristics of teachers which are associated with maximum student learning have been rather unproductive (Gage, 1972). However, Coleman (1966) found verbal ability to be important and Levin (1970) has maintained that "recruiting and retaining teachers with higher verbal scores is 5 to 10 times as effective per dollar of teaching expenditure in raising achievement scores of students as the strategy of obtaining teachers with more experience" (p. 24). Similarly, Coleman (1966) demonstrated that both general levels of academic training, and more importantly, recency of academic training is closely associated with student achievement levels. It is safe to conclude that at least these teacher characteristics are important variables in student learning.

3. Curriculum Design

School curricula have been established "to give learning direction and to maximize its effectiveness" (Stenhouse, 1975, p.24). Although there are differences of opinion as to precisely what "curriculum" is (i.e. definition) and what should be learned, it is generally agreed that school curricula should be structured (Brophy 1976, Gage 1978, Rosenshine and Berliner, 1978) and do more than pay lip-service to promoting learning. Indeed, the primary purpose of curricula should be to help students to learn and the result of an effective curriculum should be appropriate and effective learning on the part of students.

Effective and appropriate curricula should reflect sound learning principles and be based on consistent, coherent statements about what people need to learn and how they learn it — a "theory of instruction" (Bruner, 1967). In addition curricula should have clear aims, goals, and objectives that can be communicated to the learner (Rosenshine and Berliner, 1978). "If teacher and student behaviours are not random but are directed to an identified learning objective, the probability of intended student achievement will be increased" (Hunter, 1971, p.5). These aims, goals, and objectives should take into consideration the frames of reference of the learners and be based, at least in

part, on the concepts and structures, interests, needs, and emotions of the learners (West and Foster, 1976, p.81). Each objective, in turn, should be classified according to priority (e.g. critical, important, or desirable) (Pratt, 1980). They should be appropriate to the learner, attainable, and in harmony with the theory of instruction and the basic principles of learning (Gronlund, 1970).

Curricular content (i.e. knowledge, skills, values, and attitudes) and learning experiences should offer teachers "suggestions" (Pratt, 1980). "Specific content is important, but only to the extent that it is a part of a meaningful context, serves a given purpose, or is shaped by constellation of mental processes" (Taba, 1962, p.81). The content and learning experiences should reflect a moderate level of difficulty (Brophy 1976, Rosenshine and Berliner, 1978) and reflect a sequence (Coleman, 1978). They should be responsive to the diagnosed needs and interests of the learner (Gage 1978). To maximize the opportunity to learn the content and learning experiences as well as the materials used in a program should be consistent with the objectives and match the evaluation procedures (Coleman, 1978).

If the curriculum is to promote optimum personal growth and development, it must make accomodations and provisions for individual learner differences. While this depends on "expert teacher judgements of which activities and experiences best promote student growth toward attainment of desired objectives" (West and Foster, 1976, p. 265), suggestions should be made for implementing curriculum plans for particular individuals and groups of learners. Curriculum documents should include instructional alternatives (Rosenshine and Furst, 1971) and address the various individual differences in skills, abilities, stage, style, rate, motivation, and the readiness of students. When learners are unable to derive an optimal education from regular school program, special programming may be necessary. The goal should be to provide children who have unique needs with educational experiences relevant to their needs.

Knowing when learning has taken place and how much learning has taken place is an important issue for the teacher and curricula. "Teacher's use of evaluative feedback that directly relates to pupils' performances and products is positively related to increased academic performance by both high and low-ability pupils" (Walberg, 1982, p.59). Evaluation of learning is an intrinsic part of instruction and curriculum and, as such, both curricula and teachers should be sensitive to the techniques and problems associated with both formative and summative evaluation. Strategies should be suggested for teachers to evaluate learning in all stages of instruction based on the skills and material covered by a curriculum (Brophy, 1976 ; Good, 1979 ; Rosenshine and Berliner, 1978; and Rosenshire and Furst, 1971).

B. Process Variables

A wide variety of recent studies demonstrate that some process variables, involving both teacher and learners are important in the teaching-learning process. Kash and Borich (1982) summarize the research.

1. Instructional Practice (Teacher ⟷ Child)

a) Research results strongly emphasize the central role of the learner as wanting to learn and the teacher with the power to teach.

- Time spent actively engaged in learning is postively correlated with pupil achievement (Fisher, 1978; Farrell, 1977 ; McDonald, 1975; Stallings and Kaskowitz, 1978).
- Amount of allocated time for academic subjects is positively correlated with pupil achievement (Fisher, 1978; Farrell, 1977; McDonald, 1975; Stalling and Kaskowitz, 1978).
- Length of school day or year is positively correlated with pupil achievement if it is a factor in allocating time per subject (Fisher, 1978; Farrell, 1977; McDonald, 1975; Stalling and Kaskowitz, 1978).

b)
- Pupils' attending and cooperating behaviors differentiate more- and less-effective teachers across pupil socio-economic status (SES) and grade levels (Brophy, Evertson, 1974; Fisher, 1978; McDonald, 1975).
- Complications in gaining cooperation arise from the fact that learners vary in their abilities to accomplish academic tasks and in their desire to participate in classroom activities (Doyle, 1979, p.4).

c) Maximum learning occurs when the content coverage is high, while the success rate is high.

- Content coverage, the opportunity to learn, is an important variable for increasing learning (Good and Grouws, 1979).

d) Research refers to open classroom structures as a style involving flexibility of space, student choice of activity, richness of learning materials, integration of curriculum areas and more individual or small-group than large group instruction (Horwitz, 1979; Peterson, 1979). Horwitz (1979) and Peterson (1979) report no consistent differences in achievement between open and traditional classrooms. Yet, both report that students in open classrooms tend to be more creative, flexible, curious, and independent than those in traditional climates. McGee, Kauffman, and Nussen (1977) state that a classroom situation that involves an active partnership between teacher and learner increases learning.

- Direct teaching methods are positively correlated with pupil achievement of lower-order cognitive objectives (Brophy & Everston, 1974; Good and Grouws, 1975; Coker, 1976).
- Direct teaching, with slower placing of learning objectives, is positively correlated with achievement of low SES pupils (Brophy & Evertson, 1974; MacDonald, 1975).

e) A high frequency of higher order questions did not improve learner post-test scores, not even on higher level questions (Gall et al, 1975. The Stanford Program on Teaching Effectiveness, 1975).

- Higher-order questioning is negatively correlated with pupil achievement across SES elementary grade levels, and subject areas (Brophy & Evertson, 1974; Good & Gouws, 1975; Soars & Soars, 1972).
- Low-order questioning is positively correlated with pupil achievement across SES, elementary grade levels, and subject content (Brophy & Evertson, 1974; Good & Grouws, 1975; Soars & Soars, 1972).

These research results have puzzled both researchers and practitioners. Perhaps higher level conceptual thinking is not easily measured. Regardless, questioning strategies and their effects need to be studied further (Rosenshine, 1979).

f) Student-initiated questioning correlates with increased pupil learning across all SES and grade levels and subject matter.

- More-effective teachers of high SES pupils permit pupils to take the initiative in asking for help (Brophy & Evertson, 1974; Good & Grouws, 1975).
- More-effective teachers of low SES pupils persist in questioning pupils and help them to respond (Brophy & Evertson, 1974).
- More-effective teachers of both high and low SES pupils gauge questions at an appropriate level of difficulty (Brophy & Evertson, 1974; Good & Grouws, 1975; Stallings & Kaskowitz, 1974).

g) Teacher praise is more likely to motivate and encourage low SES pupils who require encouragement and acknowledgement of their success. It does not seem to affect the already positive self-concept of successful learners.

- Teacher praise is positively correlated with the academic achievement of low SES pupils (Brophy & Evertson, 1974; Stallings & Kaskowitz, 1974).
- Teacher praise shows either no relationship or negative correlations with the academic achievement of high SES pupils (Good & Grouws, 1975; Brophy & Evertson, 1974).

h) Children who are learning well in school value teacher feedback. Appropriate criticism also motivates them to improve. Those who are experiencing difficulty value teacher praise and immediate feedback.

- Teachers' use of evaluative feedback that directly relates to pupils' performances and products is positively related to increased academic performance by both high and low-ability pupils (Brophy & Evertson, 1974; Good & Grouws, 1975; Stallings & Kaskowitz, 1974).
- Too much praise and/or too much criticism can be detrimental to learning.

i) Teachers who set behavioral limits, establish rules and who apply them fairly promote a supportive learning atmosphere with pupil self-sufficiency and pupil self-control.

- Teachers' treatment of the class as one unit in pressuring for peer control is negatively related to pupil achievement across SES groups, grade levels, and subject content (Fisher, 1978).

- Establishing reasonable rules for class deportment and following through with the application of consequences is positively correlated with pupil achievement at the elementary level (Brophy & Evertson, 1974; Fisher, 1978; Gage, 1978).

j) Where creativity and higher-order concept development are the objectives of the learning task, pupils should have more freedom under supervision. Some of this freedom can be obtained by structuring tasks so that pupils can apply rules and directions. This not only offers an opportunity for the student to relate the impact of his or her skills to a task but also increases the opportunities to develop constructive, cooperative behaviors (Torrance, 1971).

- Structuring tasks for less direct cognitive control but with behavioral control is positively correlated with pupil achievement of higher-order cognitive objectives. (Soar & Soar, 1972).

k) Education is a verbal experience. Learners who lack and cannot acquire verbal skills will not likely be successful in school. The clarity of teacher presenting information and concepts is crucial to student learning. Expanding the basic skills to higher-order thinking processes requires a clarity of presentation, particularly beyond the third grade.

- Teacher clarity is positively correlated with pupils' learning (Brophy & Evertson, 1974; Good & Grouws, 1975; Stallings & Kaskowitz, 1974).
- Teacher enthusiasm contributes to the positive atmosphere required for learning (Rosenshine & Furst, 1971).

- Increased levels of the use of symbols by pupils and teachers (students' questions, discussion, time allocated to reading and mathematics, and reading time in other subjects) are positively correlated with pupil learning (Brophy & Evertson, 1974; Stallings Kaskowitz, 1974).

1) At the early levels, pupils require more structure, more teacher-pupil interaction, and immediate feedback and reinforcement. Older children are able to handle more autonomy.

- Small group instruction is positively correlated with pupil achievement in the basic skills in the first and second grade (Fisher, 1978; McDonald, 1975: Stallings & Kaskowitz, 1974).
- Instruction directed toward the whole class is positively correlated with pupil achievement in mathematics and reading at the higher levels of elementary education (Brophy & Evertson, 1974; Good & Grouws, 1975; Stallings & Kaskowitz, 1974).
- Structuring behaviors by the teacher increase learning for all children (Fisher, 1978). Structuring includes giving clear directions, setting the stage, telling and showing children what to do and informing children of the expectations.
- Pupil-to-pupil tutoring and unsupervised individual or small group work are negatively correlated with pupil achievement at the early levels of elementary education (Brophy & Evertson, 1974; Stallings & Kaskowitz, 1974).

m) The clearest image a pupil receives in the classroom is the self-image formed by the teacher's evaluations of the learner's performances and outcomes. Teacher bias and expectation have a great impact on school learning (re: cognitive abilities, sex, SES, ethnic origin, race) (Good & Brophy, 1972; Lahaderne, 1975).

- Pupils' roles that include opportunities for initiative and exploration, with access to a wider variety of activities and material, are positively correlated with measures of students' independence and self-concept development (Stallings & Kaskowitz, 1974).
- Teachers' attitudes and beliefs expressed in classroom behaviors can positively or negatively affect pupils' performance and opportunity to learn (Good & Brophy, 1972).

n) Flexibility of teaching not only meets individual learning needs, but also creates interest in learning.

- Student learning increases when teachers vary their teaching styles and use of instructional alternatives (Rosenshine & Furst, 1971).

B. Educational Climates

Educational climates have important influences on learning in school. Student achievement, performance and self-concept are affected by the classroom and school environment. Some researchers report that climate variables predict learning gains more accurately than do variables such as SES and teacher characteristics.

i) Classroom Climate

Learning is increased when children perceive that the following factors exist in a classroom atmosphere.

a) cohesiveness/supportive environment

b) satisfaction

c) appropriate task difficulty

d) formality, business-like teacher behavior

e) goal direction

f) democracy

g) appropriate materials available

h) sparing use of criticism

Friction, cliques, apathy and classroom disorganization are negatively associated with increased learning (Walberg & Haertel, 1979).

Brophy and Putnam (1979) report that student learning increases and self-concept improves in an authoritative classroom environment. The teacher, in this setting

> has the position of authority and responsibility, speaks as a mature and responsible adult, and retains ultimate decision making power. Rather than act in an authoritarian manner, however, authoritative leaders solicit input, seek consensus, and take care to see that everyone is clear about the rationale for decisions as well as the decisions themselves (Brophy & Putnam, 1979, p. 194).

Barclay and Kaehle (1979) examined the effect of mainstreamed mentally retarded students on other class members and on the classroom climate. Their study showed that the mainstreamed students were rejected by both peers and teachers. Their impact on the classroom climate was the opposite of what mainstreaming intended to do.

ii) School Climate

Increased student learning is positively correlated with:

a) good staff morale

b) teacher perception that the educational program is effective

c) constructive principal-teacher relations

d) positive, effective community-school interaction

e) strong teacher voice in formulation and execution of the educational program (Ellett & Walberg, 1979).

f) teacher interest in and commitment to their work (Schmuck & Schmuck, 1974).

Brookover and others (1978), also stress the importance of school climate in increasing the learning of children. More recently, Coleman (1981) reports that overall school policies and structures have a powerful impact on student learning and behavior.

iii) Class Size

Another factor which appears to contribute to classroom environment and student achievement is class size. Although there is no agreement on how small is small or how large is too large, Glass and Smith (1978) reported a substantial relationship between class size and favorable effects on students and teachers. On the average, student achievement, interest in school, participation and self-concept increases as class size is reduced, and the advantage rises sharply for a class of 15 and below. Reductions in size from, 28 to 25 for example, make only a small difference in average achievement. Favorable teacher effects (i.e. morale, attitudes towards students) were also noted as class size decreased.

It is clear, however, that reducing class size will have no effect if teachers do exactly the same thing in a small class as in a large one. To be effective, teachers need to use the potential of the small class situation by utilizing more individualized teaching strategies.

Although the research on variables affecting learning in schools remains somewhat in a state of disarray, it is possible to extract important evidence that can underpin improvement efforts. More importantly, the factors that make the most difference seem to be within the control of teachers and other professionals who work in schools.

Future Directions

The basic notions emerging from mainstream research about learning in schools is deceptively simple, yet profound. It can be summarized as follows:

1) Children learn at different rates and in different ways

2) Learning is an individual affair - children learn when and if they want to

3) The purpose of schools is to provide opportunities that improve the chances for children to learn. Such performance cannot be guaranteed because the exact nature of the cause and effect relationships among school variables that determine learning still remains limited and uncertain.

This paper however, advances an optimistic view that what is known about the conditions for maximizing learning in schools far exceeds what is evident in much of current practice. Increased learning cannot be guaranteed, but chances for its promotion can be greatly enhanced.

Important support for this view is found in Bloom's (1980) analysis of the major contributions of recent educational research. He concludes that:

> Perhaps the most important change is the movement from what I have termed fixed or static variables to variables which are alterable either before the teaching-learning process or as part of these processes....This shift enables researchers and educators to move from an emphasis on prediction and the classification of students to a concern for casuality and the relation between means and ends in teaching and learning (Bloom, 1981, p.1).

In discussing these "alterable variables" Bloom places particular emphasis on making the following distinctions: allocated instructional time vs. time on task (active learning time); intelligence vs. cognitive entry (previous learning); summative vs. formative evaluation, teacher traits vs. teaching behavior; and parent status vs. home environment.

These considerations are closely paralleled and corroborated by the impressive emerging literature on the nature of effective schools. Austin (1979) has reviewed several of these studies and concludes that in more effective schools, high student achievement is related to the following factors:

- More positive self-concept and a feeling of controlling their own destiny observable as early as grade three on part of children
- Teachers were more satisfied with opportunities to try new things; they were free to choose teaching techniques in response to individual pupil needs.
- Teachers were rated as warmer, more responsive, and showing more emphasis on cognitive development in classes that did not involve direct reading instruction as well as in reading classes;
- Teachers expected more children to graduate from high school, to go to college, to become good readers, and to become good citizens;
- In evaluation, the teachers relied almost completely on teacher-developed tests and teacher judgments of student achievement;
- Strong principal leadership (for example, schools "being run" for a purpose rather than "running" from force of habit);
- Strong principal participation in the classroom instructional program and in actual teaching;
- Higher expectations on the part of the principal for student and teacher performance advancement;
- Principals felt that they had more control over the functioning of the school, the curriculum and program, and their staff;
- Greater experience and more pertinent education in the roles of principals, teachers, and teacher aides;
- Schools had a longer instruction day;
- More satisfactory parent-teacher relationships;
- Job responsibilities for the teacher aides included working across all grades with primarily small low-ability groups; close involvement of teachers and paraprofessionals with pupils;
- On several measures, differences seemed to be more pronounced in grades one to three than in grades four to six.

Adapted from: Austin, p. 121

The evidence suggests that it is not a single factor that accounts for successful learning but a critical mass of positive factors which, when put together, make the difference. The question of what it takes to root professional teaching practice and educational policy making in the rich store of reliable knowledge derived from long experience and emerging research awaits increased attention. This paper is an effort to stimulate such attention.

Learning and Educational Practice: Using What We Know

This consideration of learning determinants in schools along with an acknowledgement of some salient features of schools as organizations, serves to generate the following general propositions that can guide future activities for improvement.

1. Because teaching behaviour is the direct link between student behaviour and learning, the role of the teacher is most critical in any effort to improve achievement.

2. Because of the unique needs among students and the uncertain effect of any one teaching method, teachers are required to master a broad repertoire of instructional options. Teacher decisions calling for improvisation, creativity, intuition and sensitivity need to be founded on a rational and scientific basis, and reflect the best that is known about the effective use of various methods, techniques and materials in meeting different educational goals and responding to the unique styles and needs of different learners.

3. Because the nature of school organization recognizes and promotes the importance of teacher classroom autonomy, it is continuous professional development and renewal rather than elaborate policies, regulations and bureaucratic control that will ensure effective instructional improvement and coordination. This requirement calls for a focus on subject matter knowledge, interpersonal skills, instructional methods and professional values. It demands a massive infusion of support in the form of time and money.

4. Because teachers mediate, and in the final analysis are the arbitrators over the implementation of initiatives pertaining to learning in schools, they need to understand and to have an important influence over policy decisions that affect it.

5. Because student learning is largely determined by the quality of each school's unique learning environment, every effort should be made to treat the school as the critical organizational unit for change and improvement. Elaborate administrative hierarchial structures are neither necessary nor desireable. Educational policies should promote and support important decision making, resource allocation, and professional colaboration at the school level.

6. Because the purpose of curriculum is to serve as a guide in promoting learning, it must be meaningful to the learner and relate to previous knowledge and experiences. Curriculum must be an integral part of the teacher's decision making process, and needs to account for the unique learning rhythm, speed and patterns of each child. Curriculum materials must be subjected to constant review and revision, and need to respond to developments in current research.

7. Because of the prevalence of teacher isolation, the lack of agreement about the purposes of schooling, and inadequate resources, there is a tendency for teachers to lose sight of the professional service ethic embedded in the ideal of care for student well being. Schools in turn tend to drift into a comfortable mediocrity and to rely on mindless routines in processing students. These conditions require administrators to emphasize a coordinating role through building and renewing a sense of commitment and consensus about fundamental organizational purposes and basic principles of professional practice.

8. Because the home and the school are critical partners in helping children learn, the school systems must devise meaningful ways to involve parents in the education of their children and in school decision making.

A Required Shift in Basic Assumptions

If people concerned with school improvement are to make useful progress along these lines it will require more than increased rhetoric and incremental tinkering with school organizational schemes, curriculum guides, and resource allocations. Worthwhile revitalization needs to impact on the very stuff at the core of the schooling enterprise - the cluster of human attitudes, beliefs and expectations that make it all happen.

More to the point, this paper advocates a radical shift in basic assumptions about learning and schools. This transformation will be characterized by a move away from concerns about bureaucratic routines, right answers, norms, conformity and control. Instead, its motive power will be the cornerstone principle of caring for the well being and development of each student client. This notion of "caring" is not about sentimentality or good intentions – but a "disciplined caring" and professional practice founded on concern and regard for the unique differences among students, and operationalized through fair treatment, special knowledge and skills, commitment and persistent effort.

These new assumptions will be interested in promoting lifelong learning involving the whole person as well as the acquisition of minimal literacy and numeracy skills; self-discipline rather than conformity to imposed rules; high expectations and instruction appropriate to learner needs rather than school rejects implicit in notions about "average students" and normal curves; and curiosity and creative risk taking rather than right answers.

Marilyn Ferguson (1980) has provided a provocative treatment of some of these issues and in the following synthesis raises important considerations that need to addressed if schools are to fulfill this promise and continue to provide a useful service to society.

ASSUMPTIONS OF THE OLD PARADIGM OF EDUCATION	ASSUMPTIONS OF THE NEW PARADIGM OF LEARNING
Emphasis on content, acquiring a body of "right" information, once and for all.	Emphasis on learning how to learn, how to ask good questions, pay attention to the right things, be open to and evaluate new concepts, have access to information. What is now "known" may change. Importance of context.
Learning as a product, a destination.	Learning as a process, a journey.
Hierarchical and authoritarian structure. Rewards conformity, discourages dissent.	Egalitarian. Candor and dissent permitted. Students and teachers see each other as people, not roles. Encourages autonomy.
Relatively rigid structure, prescribe curriculum.	Relatively flexible structure. Belief that there are many ways to teach a given subject.
Lockstep progress, emphasis on the "appropriate" ages for certain activities, age segregation. Compartmentalized.	Flexibility and integration of age groupings. Individual not automatically limited to certain subject matter by age.
Priority on performance.	Priority on self-image as the generator of performance.
Emphasis on external world. Inner experience often considered inappropriate in school setting.	Inner experience seen as context for learning. Use of imagery, storytelling, dream journals, "centering" exercises, and exploration of feelings encouraged.

ASSUMPTIONS OF THE OLD PARADIGM OF EDUCATION	ASSUMPTIONS OF THE NEW PARADIGM OF LEARNING
Guessing and divergent thinking discouraged.	Guessing and divergent thinking encouraged as part of the creative process.
Emphasis on analytical linear, left-brain thinking.	Strives for whole-brain education. Augments left-brain rationality with holistic, nonlinear, and intuitive strategies. Confluence and fusion of the two processes emphasized.
Labeling (remedial, gifted, minimally dysfunctional, etc.) contributes to self-fulfilling prophecy.	Labeling used only in minor prescriptive role and not as fixed evaluation that dogs the individual's educational career.
Concern with norms.	Concern with the individual's performance in terms of potential. Interest in testing outer limits, transcending perceived limitations.
Primary reliance on theoretical, abstract "book knowledge."	Theoretical and abstract knowledge heavily complemented by experiment and experience, both in and out of classroom. Field trips, apprenticeships demonstrations, visiting experts.
Classrooms designed for efficiency, convenience.	Concern for the environment of learning: lighting, colors, air, physical comfort, needs for privacy and interaction, quiet and exuberant activities.

ASSUMPTIONS OF THE OLD PARADIGM OF EDUCATION	ASSUMPTIONS OF THE NEW PARADIGM OF LEARNING
Bureaucratically determined, resistant to community input.	Encourages community input, even community control.
Education seen as a social necessity for a certain period of time, to inculcate minimum skills and train for a specific role.	Education seen as lifelong process, one only tangentially related to schools.
Increasing reliance on technology (audiovisual equipment, computers, tapes, texts), dehumanization.	Appropriate technology, human relationships between teachers and learners of primary importance.
Teacher imparts knowledge; one-way street.	Teacher is learner, too, learning from students.

(Marilyn Ferguson (1980), pp. 289-291)

It is not the purpose of this paper to develop these themes extensively, but to point out that beyond the narrow focus of traditional educational research and thought, there lies a rich intellectual ferment suggesting powerful new definitions of learning - its limits and how to promote it.

These new approaches to learning, loosely grouped under the title of transpersonal education, are rooted in systems theory, new discoveries of how the brain functions, the complementarity of right brain and left brain, the interaction of mind and body, and expanding notions of what we mean by consciousness. From these sources arise new concepts of holistic education, the importance of meaning and patterns, the operation of the mind in transforming information, the value of supportive environments for difficult learning tasks, how high expectations and positive self-concept affect one's capacity to learn, and the priority that must be given to the inner experience of the learners, their intuition and creativity.

The proponents of these notions build a convincing case that the greatest limitation to learning is teacher-caused, and that traditional and outdated concepts of learning, teaching and schooling impose these limits. Leslie Hart (1978), has reviewed this new knowledge by looking at developments in the field of ethology, information processing psychologies and computer science. He concludes that present schooling is "brain antagonistic" and suggests ways to make it more "brain compatable".

Similarly, Norman Henchey (1981) addresses the challenge and sketches the following possibilities as a reasoned response.

1) The federal government becomes more active in developing a social policy framework which includes learning and communication policies. Ministries of Education expand their mandate from the maintenance of formal school systems at elementary, secondary, and post-secondary levels -- with adult education added on more or less as an afterthought -- to the broader notion of learning services of all kinds, in many settings beyond formal schools, for all citizens in the society, using a variety of media.

2) School boards are merged into integrated structures of community services to include community planning, child care, recreation, sports, cultural activities, adult career retraining programs, cultural services and resources, assistance to voluntary organizations, social assistance, health, legal, and consumer education, and educational care for the aged.

3) Schools become fewer in number, more diversified in approach (residential, drop-in centre, learning clinic, high technology facility, scholarly resource) and service all members of the community the way museums and libraries now do.

4) School systems become learning networks including not only schools but also some parts of the media, libraries, community centres, voluntary organizations, cultural activities, and professional bodies (clergy, doctors, lawyers, social workers, economists, artists).

5) Our current ideas of "passing through the school system" are changed and the present links among compulsory school attendance, fixed and graded curriculum, examination systems, and certification break down.

6) Learning programs are developed by many groups and individuals, including government agencies, public corporations, voluntary groups, professional bodies, teachers in private practice, and multinational corporations specializing in educational hardware and software.

7) The roles of teachers become diversified, broadening from that of the classroom communicator of subject matter and basic skills to include learning specialist, counsellor for individual students, small group animator, communications specialist, role model, scholar, independent consultant, learning evaluator, member of interdisciplinary teams of specialists, adapter of programs to the needs of individuals, and researcher. Obviously no one teacher performs all roles but many more activities are recognized as teaching than is now the case. Teachers, like other professionals such as engineers, social workers, psychologists, and planners, must be able to function in a variety of settings and must be trained accordingly (Henchey, 1981).

Clearly the kinds of changes advocated by Ferguson and Henchey need to be considered by all involved in educational decision making. It is the classroom teacher however, who can respond most swiftly and effectively.

Teachers wishing to shift from preoccupation with maintenance learning to innovative learning can find useful direction in the models of teaching advanced by Joyce and Weil (1980). These authors draw from a wide selection of psychological and philosophical orientations, and provide vivid descriptions and analysis of twenty-two different teaching strategies.

Serious attention to these models can go a long way in providing expanded learning opportunities for children in schools. The instructional technology is already available for schools to meet a broad range of learning outcomes ranging from basic skills acquisition to personal growth, values clarification, and self-actualization.

In conclusion, it would seem that school decision makers have more than one available response in meeting the requirements of a learning society. The compounding increase in the world's store of knowledge, the potential of the silicon chip, the communication revolution, and new insights into learning include both challenges and opportunities. The current trend toward retrenchment with its focus on narrowly conceived cognitive skills, standardization, greater bureaucratic control, and a largely technical role for school professionals, need not become a destiny. Those who would review curriculum and instruction with a view to improvement need to take account of this new knowledge about the learning process, and develop new respect for the potential of people to learn and new confidence about how to promote it more effectively.

BIBLIOGRAPHY

BIBLIOGRAPHY

Allport, Gordon W. Pattern and Growth In Personality. New York: Holt, Rinehart and Winston, 1961.

Austin, G.R. "Exemplory Schools and the Search for Effectiveness" Educational Leadership, 1979, Vol. 37 No. 1, pp. 10-14.

Barclay, James R. and Kaehle, T.J. "Impact of Handicapped Students on Other Students in the Classroom". Journal of Research and Development in Education. Vol. 12 (Summer 1979), pp. 80-92.

Bledsoe, J.C. "Self-Concept of Children and Their Intelligence, Achievement, Interests and Anxiety" Childhood Education 1967.

Bloom, Benjamin S. All Our Children Learning. N.Y.: McGraw-Hill Book Company, 1981.

de Bonce, Edward. Practical Thinking. Harmondsworth, Middlesex, Eng.: Penguin Books, 1971.

Brookover, W.B. et al. Self-Concept of Ability and School Achievement III: Relationship of Self-Concept to Achievement in High School U.S. Office of Education, Cooperative Research Project #2831, East Lansing, Michigan State University.

Brophy, Jere E. "Reflections on Research in Elementary Schools," Journal of Teacher Education. Vol. XXVIII, No. 1, Spring 1976, pp. 31-34.

Brophy, Jere E., and Evertson, C.M. "Teacher Behavior and Student Learning in Second and Third Grades." In Borich, Gary D., The Appraisal of Teaching: Concepts and Process. Reading, Mass.: Addison-Wesley Publishing Co., 1977.

Brophy, Jere E., and Evertson, C.M. The Texas Teacher Effectiveness Project: Presentation of Non-Linear Relationships and Summary Discussion, Research Report No. 74-76, Austin Texas: Research and Development Center for Teacher Education, 1974.

Brophy, Jere E., and Putnam, Joyce G. "Classroom Management in the Elementary Grades." In Duke, Daniel L., Classroom Management, Seventy-Eighth Yearbook of the National Society for the Study of Education, Part 2, Chicago: University of Chicago Press, 1979.

Bruner, Jerome. Toward a Theory of Instruction. Belnap, 1967.

Bruner, Jerome. The Process of Education. Cambridge: Harvard University Press, 1968.

Clark, Barbara. Growing Up Gifted. Columbus, Ohio: Merrill Publishing Company, 1979.

Coker, H., Lorentz, J.L., and Coker, S. Interim Report on the Carroll County CBTC Project. Fall, 1976. Atlanta: Georgia State Department of Education, 1976.

Coleman, J.S. et al. Equality of Educational Opportunity. Washington, D.C.: U.S. Government Printing Office, 1966.

Coleman, J.S., Hoffer, T., and Kilgore, S. Public and Private Schools: A Report to the National Center for Education Statistics by the National Opinion Research Centre. University of Chicago, March 1981.

Combs, A.W. et al. Helping Relationships: Basic Concepts For the Helping Profession. Boston: Allyn and Bacon, 1971.

Dall, Ronald C. Curriculum Improvement Decision Making and Process, 5th ed. Boston: Allyn and Bacon, Inc., 1982.

Dembo, Myron H. Teaching For Learning. Santa Monica: Goodyear Publishing Co. Inc., 1977.

Doyle, Walter. "Research on Teaching in Classroom Environments." Paper presented at the conference on "Exploring Issues in Teacher Education: Questions for Future Research" Austin, Texas, January, 1979.

Dunn, R. and Dunn, K. Educator's Self-Teaching Guide to Individualizing Instructional Programs. West Nyack, N.Y.: Park Publishing Co. Inc., 1975.

Dunn, R. and Dunn, K. Practical Approaches to Individualizing Instruction West Nyack, N.Y.: Parker, 1972.

Ellett, Chad D. and Walberg, Herbert J. "Principal Competency and School Climate." In Walberg, Herbert J. (ed.) Educational Environments and Effects: Evaluation, Research and Policy. Berkeley, Calif.: McCutchan, 1979.

Epstein, Herman. "Growth Spurts During Brain Development: Implications for Educational Policy". In Education and the Brain, ed. J. Chall, 1978.

Erickson, Eric H. "Growth and Crises of the Healthy Personality" Personality in Nature, Society and Culture. C. Kluckholm et al eds., revised ed. New York: Knoph, 1955.

Farrell, Joseph P. "The IEA Studies: Factors That Affect Achievement in Six Subjects and Twenty-one Countries". Teachers College Record Vol. 79, December 1977.

Ferguson, Marilyn. The Aquarian Conspiracy: Personal and Social Transformation in the 1980's. Los Angeles: J.P. Torshen, 1980.

Feuerstein, R. The Dynamic Assessment of Retarded Performers: The Learning Potential Assessment Device Theory, Instrument and Techniques. Baltimore: University Park Press, 1979.

Fisher, Charles et al. Teaching and Learning in the Elementary School: A Summary of the Beginning Teacher Evaluation Study. San Francisco: Far West Laboratory for Educational Research and Development, 1978.

Gage, N.L. The Scientific Basis for the Art of Teaching. New York: Teachers College Press, Columbia University, 1979.

Gage, N.L. "The Yield of Research on Teaching," Phi Delta Kappan. Vol. 60, No.3, November 1978, pp. 229-235.

Gagne, R.M. The Conditions of Learning. New York: Holt, Rinehart and Winston Inc., 1970.

Gall, M.D. "The Use of Questions in Teaching" Review of Educational Research, Vol. 40, No. 5, 1975.

Glass, G.V. and Smith, M.C. "Meta-Analysis of Research on the Relationship of Class Size and Its Relationship to Attitudes and Instruction." American Educational Research Journal, Winter 1980, Vol. 17, No. 4, pp. 419-433.

Glass, G.V. and Smith, M.C. "Meta-Analysis of Research on the Relationship of Class Size and Achievement." Boulder, Colorado: Laboratory of Educational Research, University of Colorado, September, 1978.

Good, T.L. and Grouws, D.A. A Process - Product Relationship in Fourth-grade Mathematics Classrooms. National Institute of Education Grant: University of Missouri, 1975.

Good, T.L. and Grouws, D. "The Missouri Mathematics Effectiveness Project An Experimental Study in Fourth Grade Classrooms" Journal of Educational Psychology, Vol. 71, (June 1979).

Good, T.L. and Brophy, Jere E. "Behavioral Expression of Teacher Attitudes" Journal of Educational Psychology, Vol. 63 (December 1972) pp. 617-24.

Goodlad, John I. et al. Curriculum Inquiry: The Study of Curriculum Practice. New York: McGraw-Hill, 1979.

Gregorc, A. "Learning/Teaching Styles: Their Nature and Effects," In Student Learning Styles: Diagnosing and Prescribing Program. National Association of Secondary School Principals, Virgina, 1979.

Gronlund, N. Stating Behavioral Objectives for Classroom Instruction. New York: Macmillan, 1970.

Haertel, G. and Walberg, H.J. "Social-Psychological Environments and Learning: A Quantative Synthesis." Paper presented at the annual meeting of the American Educational Research Association, San Francisco, April, 1979.

Havighurst, R. Developmental Tasks and Education 3rd ed. New York: McKay, 1973.

Harnischfeger, A. and David, W. "Teaching Learning Processes in Elementary School: A Synoptic View". Curriculum Inquiry,Vol. 6, No. 1 (Fall 1976), pp. 5-43.

Hart, Leslie A. "The New Brain Concept of Learning." Phi Delta Kappan, Vol. 59, No. 6, February 1978, pp. 393-396.

Henchey, Norman. "Imperatives for the Eighties: Pressures, Challenges, and Opportunities for Educational Administrators in Canada." Paper presented at the Canadian Education Association Short Course, Banff, Alberta, May, 1981.

Hilgard, Ernest, and Bower, G.H. Theories of Learning 3rd ed. New York: Appleton and Century-Crofts, 1966.

Horwitz, Robert A. "Effects of the Open Classroom." In Walberg, Herbert J. (ed.) Educational Environments and Effects: Evaluation, Research, and Policy. Berkeley, Calif.: McCutchan, 1979.

Horwitz, R.A. "Psychological Effects of the Open Classroom" Review of Educational Research, Vol. 49, (Winter 1979), pp. 71-86.

Hunter, Madeline "A Clinical Theory of Instruction (CTI)", publication pending.

Iverson, B.K. and Walberg H.J. "Home Environment and Learning: A Quantitative Synthesis." Paper presented at the annual meeting of the American Educational Research Association, San Francisco, 1979.

Joyce, Bruce. "Listening to Different Drummers: Evaluating Alternative Instructional Modes." In Competency Assessment, Research and Evaluation: A Report of a National Conference. Albany, N.Y.: 1975, pp. 61-81.

Joyce, Bruce. Selecting Learning Experiences: Teaching Theory and Practice. Washington, D.C.: A.S.C.D., 1978.

Joyce, Bruce and Wiel, B. Models of Teaching. Englewood Cliffs, N.J.: Prentice-Hall, 1972.

Joyce, Bruce. Flexibility in Teaching. New York: Longman Inc., 1981.

Kagan, J. "Understanding the Psychology of Mental Growth". Grade Teacher Magazine. 1966.

Kash, M.M. and Borich, G.D. "Teachers", Improving Educational Standards and Productivity. Berkeley, Calif.: McCutchan Pub. Co., 1982.

Kolesnik, Walter B. Learning Educational Applications. Boston: Allyn and Bacon, 1976.

Lahaderne, Henrietta M. "The Feminized Elementary School: An Unpromising Myth to Explain Boys' Reading Problems" Paper presented at the annual meeting of the A.E.R.A., Washington, D.C., March, 1975.

Lawson, Anton E., ed. The Psychology of Teaching for Thinking and Creativity. Columbus, Ohio: AETS, 1979.

Levin, H.M. "A Cost-Effectiveness Analysis of Teacher Selection" The Journal of Human Resources, Vol. 5, No.1, 1970.

Maslow, A.H. Towards a Psychology of Being (2nd ed.) New York: Van Nastrand, 1968.

Maslow, A.H. Motivation and Personality (2nd ed.) New York: Harper & Row, 1970.

McDonald, F.J. et al. Final Report on Phase II of the Beginning Teacher Evaluation Study. Prepared for the California Commission on Teacher Preparation and Licensing, Sacramento, Princeton, N.J., 1975.

McGee, Charles S.,Kaufman, James M. and Nussen, Judith L. "Children as Therapeutic Change Agents: Reinforcement Intervention Paradigms." Review of Educational Research, Vol. 47, (Summer 1977) pp. 451-77.

McNeil, John D. Curriculum: A Comprehensive Introduction (2nd. ed.) Boston: Little, Brown and Co., 1981.

Nebes, R. "Man's So Called 'Minor' Hemisphere" UCLA Educator, Vol. 17, 1975,

Peterson, Penelope L. "Direct Instruction Reconsidered." In Peterson, Penelope L. and Walberg, Herbert J. (eds.) Research on Teaching: Concepts, Findings and Implications. Berkeley: McCutchan, 1979.

Piaget, J. and Inbelder, B. The Growth of Logical Thinking from Childhood to Adolescence. New York: Boston Books, 1958.

Piaget, J. and Inbelder, B. The Psychology of the Child. New York: Basic Books, 1969.

Pinar, William F. "Notes on the Curriculum Field 1978" Educational Researcher No. 8 (Sept. 1978), pp. 5-12.

Pratt, David. Curriculum: Design and Development. New York: Harcourt Brace and Jovanovich Inc., 1980.

Rist, R. "Student Social Class and Teacher Expectations: The Self-Fulfilling Prophecy in Ghetto Education" Harvard Educational Review, 1970, pp. 411-451.

Rosenshine, B. and Berliner, D. "Academic Engaged Time" British Journal of Teaching Education Vol. 4, No. 1, January 1978, pp. 3-16.

Rosenshine, B. and Furst, N. "Research on Teacher Performance Criteria". In Smith, B.O. (ed.) Research in Teacher Education. Englewood Cliffs, N.J.: Prentice-Hall, 1971.

Rosenshine, B. "Content, Time and Direct Instruction". In Peterson, P. and Walberg, H., (eds.) Research on Teaching. Berkeley, Calif.: McCutchan, 1979.

Rosenshine, B. "Teaching Behaviors and Student Achievement." A Review of Research: Stockholm, International Association for the Evaluation of Educational Achievement, 1970.

Samples, B. "Learning With the Whole Brain" Human Behavior, Vol. 4, 1975, pp. 18-23.

Schmuck, Richard A. and Schmuck, Patricia A. A Humanistic Psychology of Education-Making the School Everybody's House. Palo Alto, Calif.: National Press Books, 1974.

Sigel, I.E. and Coop, R.H. "Cognitive Style and Classroom Practice" In Coop, R.H. and White, K. (eds.) Psychological Concepts in the Classroom. New York: Harper and Row, 1974.

Silberman, C.E. Crisis in the Classroom. New York: Random House, 1970.

Soar, Robert S. "Optimum Teacher - Pupil Interaction for Pupil Growth". Educational Leadership, Vol. 26, (December, 1968) pp. 275-80.

Soar, Robert S.; and Soar, Ruth M. "An Empirical Analysis of Selected Follow-Through Programs: An Example of a Process Approach to Evaluation." In Gordon, I.J. (ed.) Early Childhood Education. Seventy-First Yearbook of the National Society for the Study of Education, Part 2. Chicago: University of Chicago Press, 1972.

Stallings, Jane A.; and Kaskowitz, David. Follow-Through Classroom Observation Evaluation 1972-73. Menlo Park, Calif.: Stanford Research Institute, 1974.

Stallings, Jane A. "How Instructional Processes Relate to Child Outcomes in a National Study of Follow-Through." Journal of Teacher Education, Vol. 27 (Spring 1976), pp. 43-47.

Stenhouse, Lawrence. An Introduction to Curriculum Research and Development. London: Heinemann, 1975.

Sylwester, Robert. "Educational Implications of Recent Brain Research". Educational Leadership, October, 1981.

Taba, Hilda. Curriculum Development: Theory and Practice. New York: Harcourt Brace Jovanovich, 1962.

Torrance, E. Paul. "Structure Can Improve the Group Behavior of Five-Year-Old Children" Elementary School Journal, Vol. 72, (November 1971).

Torshen, K.A. "The Relation of Classroom Evaluation to Students' Self-Concepts And Mental Health". Unpublished doctoral dissertation, University of Chicago, 1969.

Tyler, Ralph W. Basic Principles of Curriculum and Instruction. Chicago, Ill.: University of Chicago Press, 1950.

Tyler, Ralph W. "Utilizing Research in Curriculum Development," Theory Into Practice, Vol. 13, No. 1 (February 1974), pp. 5-11.

Walberg, Herbert J. (ed.) Improving Educational Standards and Productivity. Berkeley, Calif.: McCutchan Pub. Co., 1982.

Wattenberg, W.W. and Clifford, C. "Relation of Self-Concepts to Beginning Achievement in Reading" Child Development, 1964.

West, Charles K.; and Foster, Stephen. The Psychology of Human Learning and Instruction in Education. Belmont, Calif.: Wadsworth Pub. Co. Inc., 1976.

Yee, A. "Interpersonal Attitudes of Teachers and Advantaged and Disadvantaged Pupils" Journal of Human Resources, Vol. 3, 1968, pp. 327-345.

Zais, Robert, S. Curriculum: Principles and Foundations. New York: Thomas Y. Crowell Co. Inc., 1976.

Zimmerman, I.L.; and Allebrand, G.N. "Personality Characteristics and Attitudes Toward Achievement of Good and Poor Readers." Journal of Educational Research, Vol. 59, 1965.